# RADIO IMAGES PAINTED ON SCREEN BY PENCIL BEAMS

Dr. Vladimir Zworykin, With the New Cathode Ray Tube Used in Television to Greatly Simplify Reception of the Images. The Pictures Appear on the Round End of the Tube and Are Then Projected on a Mirror or Screen.

## NEW CATHODE RAY TUBE PUSHES TELEVISION AHEAD

### Whirling Disks and Neon Tube Are Eliminated by Latest Device—Machine Is Simplified and Takes Radio Vision Near the Parlor

TELEVISION has taken another step nearer the home. The whirling disk heretofore utilized to scan the images has been eliminated from the circuit by Dr. Vladimir Zworykin, who has introduced the cathode ray tube to produce the beams of light that paint the images on the screen. Dr. Zworykin is an engineer associated with the research laboratories of the Westinghouse Electric and Manufacturing Company at Pittsburgh.

He has also dispensed with the neon tube and with all moving parts, thereby simplifying the television receiver, making it foolproof and more practical for use in the home.

Dr. Zworykin asserts that he is ready to discuss "the practical possibility of flashing radio images on motion-picture screens so that large audiences can view the television broadcasts of important events as sent out from a central station."

**Sight and Sound Blended.**

"Visual broadcasts in the future will be synchronized with sound," said Dr. Zworykin. "The cathode ray television receiver has no moving parts, making it more easily usable by the rank and file of the radio audience. It is quiet in operation and synchronization of transmitter and receiver is accomplished easily, even when using a single radio channel.

"Another advantage is that, using a fluorescent screen, the persistence of the eye's vision is aided and it is possible to reduce the number of pictures shown each second without noticeable flickering. This in turn allows a greater number of scanning lines and results in the picture being produced in greater detail without increasing the width of the radio channel."

The apparatus used for demonstration is not in commercial form. It is an experimental machine from the Westinghouse research laboratories.

The pictures or images formed by the cathode ray device measure about 4 by 5 inches. To employ the apparatus successfully for the broadcasting and reception of images Dr. Zworykin found it necessary to develop a new type of cathode ray tube, which is called the "kinescope." A pencil of electrons from the cathode tube bombards a screen of fluorescent material, that is, a substance which becomes brilliant or fluorescent where the electrons strike the material. The pencil of electrons follows the movement of the scanning light beam in the transmitter while its intensity is regulated by the strength of the impulses received from the transmitter. The movements of the scanning beam, consequently of the cathode ray pencil, are so rapid that the eye receives a perfect impression of a continuous miniature motion picture. A reflecting mirror mounted on the receiver permits the picture to be observed by a number of spectators.

The transmitter consists of a motion-picture projector rebuilt so that the film passes the film gate downward at a constant speed. This movement is the vertical component of scanning.

The horizontal scanning is accomplished by sweeping the film crosswise with a point of light at a speed faster than the speed of downward movement, consequently the picture passing through the gate is scanned crosswise and from bottom to top by a series of horizontal lines. The light is supplied by an ordinary automobile bulb focused on a diaphragm. The latter in turn is focused on the film and the light which passes through is again refocused as a stationary spot on the photo cell. In this way the photo-cell current is independent of the surface sensitivity variations of the cell. The horizontal scanning is accomplished by deflecting the light beam by means of a vibrating mirror.

Mr. Zworykin sums up the advantages of the cathode tube in the television receiver as follows: The absence of moving mechanical parts, quietness of operation; simplicity of synchronization even on a single carrier channel; ample amount of light; the persistence of fluorescence of the screen which aids persistence of the vision of the eye and permits reduction of a number of pictures per second without noticeable flickering. This in turn allows a greater number of lines and consequently better details of the picture without increasing the width of the frequency band.

The new device is said to hold much promise for use in homes. When commercially perfected it will be simple to operate. There will be no scanning disk to keep in step with the whirling disk at the transmitter. The light and electron beams or pencils, being of no physical weight compared with ordinary mechanical moving parts, offer no resistance to the device used to produce accurate synchronous operation of transmitter and receiver. Thus one of the greatest problems of visual broadcasting is solved. The new receiver is silent in operation and offers no interference to sound broadcasting channels. The system will not be wasteful of broadcasting channels, according to Dr. Zworykin. One channel is sufficient